

WHAT IS CLAIMED IS:

1. A liquid crystal display device, comprising:
a liquid crystal panel including a liquid crystal layer
and an electrode for applying a voltage to the liquid crystal
5 layer; and

a driving circuit for supplying a driving voltage to the
liquid crystal panel, wherein

the liquid crystal panel exhibits, in its voltage-
transmittance characteristics, an extreme transmittance at a
10 voltage equal to or lower than a lowest gray-level voltage,
and

the driving circuit supplies to the liquid crystal panel
a predetermined driving voltage overshooting a gray-level
voltage corresponding to an input image signal of a current
15 vertical period, according to a combination of an input image
signal of an immediately preceding vertical period and the
input image signal of the current vertical period.

2. The liquid crystal display device according to claim
20 1, wherein a difference in retardation of the liquid crystal
panel between a state where a voltage is not applied and a
state where a highest gray-level voltage is applied is 300 nm
or more.

25 3. The liquid crystal display device according to claim

1, wherein the liquid crystal panel is a transmission-type liquid crystal panel, and the extreme transmittance provides a maximum transmittance.

5 4. The liquid crystal display device according to claim 1, wherein a single vertical period of the input image signal corresponds to a single frame, at least two fields of the driving voltage correspond to a single frame of the input image signal, and the driving circuit supplies, at least in a 10 first field of the driving voltage, a driving voltage overshooting a gray-level voltage corresponding to an input image signal of a current field to the liquid crystal panel.

15 5. The liquid crystal display device according to claim 1, wherein the liquid crystal layer is a homogeneous-orientation liquid crystal layer.

20 6. The liquid crystal display device according to claim 1, wherein the liquid crystal panel further includes a phase compensator, three principal refractive indices na, nb and nc of an index ellipsoid of the phase compensator have a relation of $na = nb > nc$, and the phase compensator is arranged so as to cancel at least a part of retardation of the liquid crystal layer.

7. A liquid crystal display device, comprising:

a liquid crystal panel including a plurality of picture-element capacitors arranged in a matrix, and thin film transistors respectively electrically connected to the

5 plurality of picture-element capacitors; and

a driving circuit for supplying a driving voltage to the liquid crystal panel, wherein

the liquid crystal display device updates display every vertical period by rendering the plurality of picture-element

10 capacitors in a charged state corresponding to the input image signal,

each of the plurality of picture-element capacitors includes a liquid crystal capacitor formed from a corresponding picture-element electrode, a counter electrode

15 and a liquid crystal layer provided between the picture-element electrode and the counter electrode, and a storage capacitor electrically connected in parallel with the liquid crystal capacitor, a capacitance ratio of the storage capacitor to the liquid crystal capacitor being 1 or more,

20 and

the picture-element capacitor retains 90% or more of a charging voltage over a single vertical period, when at least a highest gray-level voltage is applied.

25 8. The liquid crystal display device according to claim

7, wherein the driving circuit supplies to the liquid crystal panel a predetermined driving voltage overshooting a gray-level voltage corresponding to an input image signal of a current vertical period, according to a combination of an
5 input image signal of an immediately preceding vertical period and the input image signal of the current vertical period.

9. The liquid crystal display device according to claim
10 8, wherein, for the input image signal of every gray level, the driving circuit supplies to the liquid crystal panel the driving voltage overshooting the gray-level voltage corresponding to the input image signal of the current vertical period.

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10. The liquid crystal display device according to claim
7, wherein the liquid crystal layer of the liquid crystal panel includes a nematic liquid crystal material having a positive dielectric anisotropy, the liquid crystal layer
20 included in each of the plurality of picture-element capacitors includes first and second regions having different orientation directions, and

the liquid crystal panel further includes a pair of polarizers arranged so as to orthogonally cross each other
25 with the liquid crystal layer interposed therebetween, and a

phase compensator for compensating for a refractive index anisotropy of the liquid crystal layer in a black display state.

5 11. The liquid crystal display device according to claim
7, wherein the liquid crystal layer is a homogeneous-
orientation liquid crystal layer.

10 12. The liquid crystal display device according to claim
11, wherein the liquid crystal panel further includes a phase
compensator, three principal refractive indices na, nb and nc
of an index ellipsoid of the phase compensator have a
relation of $na = nb > nc$, and the phase compensator is
arranged so as to cancel at least a part of retardation of
15 ~~the liquid crystal layer.~~